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EXAMINER

WANG, QUAN ZHEN

ART UNIT PAPER NUMBER

2633

DATE MAILED: 07/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-----------------|--------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/076,748 | UDA ET AL. | |
| | Examiner | Art Unit | |
| | Quan-Zhen Wang | 2633 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 May 1605.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-30 and 32 is/are rejected.
- 7) ☒ Claim(s) 31 and 37 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 27-29, 33-35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 27 recites the limitation "... the selected one of the wavelengths ..." in line

2. There is insufficient antecedent basis for this limitation in the claim.

Claim 28 recites the limitation "... the selected one of the wavelengths ..." in line

2. There is insufficient antecedent basis for this limitation in the claim.

Claim 29 recites the limitation "... the selected one of the wavelengths ..." in line

2. There is insufficient antecedent basis for this limitation in the claim.

Claim 33 recites the limitation "... the selected one of the wavelengths ..." in line

2. There is insufficient antecedent basis for this limitation in the claim.

Claim 34 recites the limitation "... the selected one of the wavelengths ..." in line

2. There is insufficient antecedent basis for this limitation in the claim.

Claim 35 recites the limitation "... the selected one of the wavelengths ..." in line

2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

Art Unit: 2633

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-5, 12-18, 24-28, and 33-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Irie (U.S. Patent US 6,682,713 B2) in view of Sugata (U.S. Patent US 5,907,429).

Regarding claims 1 and 14, Irie teaches a system of controlling optical signal during transmission, comprising: a first (fig. 11, the optical fiber between 26 and 34) and second optical fibers (fig. 11, the optical fiber between 48 and 28) for transmitting a wave division multiplexed optical signals having a predetermined set of ranges of wavelength (fig. 1, terminal device 2 comprising a plurality of transmitters 12 and an optical multiplexing unit 14 to generate wave division multiplexed optical signals of a predetermined wavelength ranges); an amplifier (fig. 11, elements 30,32, and 48) connected to the first optical fiber for amplifying the wave division multiplexed optical signal according to a predetermined amplification characteristic (the amplification characteristic is inherently predetermined) to generate an amplified wave division multiplexed optical signal; a first monitor (fig. 11, detector PD 78) connected to the second optical fiber for monitoring a total optical strength level of at least one of the ranges of the amplified wave division multiplexed optical signal (column 8, lines 22-25); a second monitor (fig. 11, TILT SENSOR 72) connected to the second optical fiber for monitoring a probe optical strength level of at least one of the wavelengths of the

Art Unit: 2633

amplified wave division multiplexed optical signal (column 8, lines 16-21); and an adjustment unit (fig. 11, element 74 and 80) connected to the amplifier, the first and second monitor for adjusting the amplification characteristic based upon the total optical strength level and the probe optical strength level so as to substantially reduce a gain tilt and an optical signal-to-noise ratio in the amplified wave division multiplexed optical signal (column 8, lines 16-31). The system of Irie differs from the claimed invention in that Irie does not specifically disclose to monitor an average value of a total optical strength level of at least one of the ranges of the amplified wave division multiplexed optical signal and adjust amplification based upon the average value of the total strength level and the probe optical strength so as to substantially reduce a gain tilt. However, since the number of channels in the system of Irie does not change (fig. 1), one of ordinary skill in the art at the time when the invention was made would be readily obtain an average value from the total optical strength level. For example, Sugata discloses that if the total power of N channel is NP_o , then the average power is P_o (column 2, lines 65-67 and column 3, lines 1-5). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to monitor an average value of a total optical strength, as it is taught by Sugata, and adjust amplification based upon the average value of the total strength level and the probe optical strength so as to substantially reduce a gain tilt in order to control the amplification of the amplifier.

Regarding claims 2, 4, 15, and 17, Irie further teaches that the system comparing the probe optical strength level to a predetermined gain tilt value (inherent) to generate

Art Unit: 2633

a first comparison result (fig. 11, CONTROL CIRCUIT 74); and controlling said amplifying step based upon the first comparison result (fig. 11, CONTROL CIRCUIT 74 and pump laser LD 36); comparing (inherent) the total optical strength level to a predetermined output level value to generate a second comparison result (fig. 11, CONTROL CIRCUIT 80); and controlling said amplifying step based upon the second comparison result (fig. 11, CONTROL CIRCUIT 80 and pump laser LD 42).

Regarding claims 3, 5, 16, and 18, the predetermined gain tilt value is inherently retrieved from a storage table (fig. 5, 64; column 6, lines 32-44) in the system taught by Irie.

Regarding claims 12-13, and 24-25, it is inherent that the amplifying step is adjusted with respect to an output level of the amplified wave division multiplexed optical signal, and is adjusted with respect to a gain tilt of the amplified wave division multiplexed optical signal (column 8, lines 22-31).

Regarding claim 26, Irie further discloses that the transmission capacity by a single optical fiber can be increased according to the number of WDM channel (column 1, lines 51-53). Therefore, the number of wavelengths is inherently counted.

Regarding claims 27 and 33, as they are understood in view of the above 112 problem, Irie further teaches to monitor optical strength level of the shortest one of the wavelength.

Regarding claims 28 and 34, as they are understood in view of the above 112 problem, Irie further teaches to monitor optical strength level of the longest one of the wavelength.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 6-11, and 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Irie (U.S. Patent US 6,682,713 B2) in view of Sugata (U.S. Patent US 5,907,429) and further in view of Kobayashi et al. (U.S. Patent US 6,111,688).

Regarding claims 6 and 19, Irie and Sugata differs from the claimed invention in that Irie and Sugata do not specifically teach monitoring an input total optical strength level of at least one of the ranges of the wave division multiplexed optical signal; and monitoring an input probe optical strength level of at least one of the wavelengths of the wave division multiplexed optical signal as claimed. However, it is well known to a person of ordinary skill in the art at the time when the invention was made to monitor both input and output powers of an optical amplifier to control the gain and output power of the optical amplifier. For example, Kobayashi in figure 4 teaches to control the gain tilt and gain power (fig. 4, Gain CALCULATING CIRCUIT 60 and CONTROL CIRCUIT 30) of an optical amplifier by monitoring both the input (fig. 4, Coupler 42, filter 56, and detector 58) and output (fig.4, coupler 48, filter 62, and detector 64) of the optical amplifier. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to further monitoring an input total optical strength

Art Unit: 2633

level of at least one of the ranges of the wave division multiplexed optical signal using a third monitor; and further monitoring an input probe optical strength level of at least one of the wavelengths of the wave division multiplexed optical signal using a fourth monitor. One person of ordinary skill in the art would have been motivated to introduce the additional monitors in order to precisely control the optical amplifier.

Regarding claims 7, 10, and 20, Irie further teaches transmitting the amplified wave division multiplexed optical signal to a receiving unit (fig. 1, Receiving Unit 4) via an optical fiber of a predetermined length (inherent). Irie differs from the claimed invention in that Irie does not specifically teach monitoring a transmitted total optical strength level of at least one of the ranges of the amplified wave division multiplexed optical signal at the receiving unit after said transmitting step; and monitoring a transmitted probe optical strength level of at least one of the wavelengths of the amplified wave division multiplexed optical signal at the receiving unit after transmitting step. However, it is well known to a person in the art at the time when the invention was made to include a pre-amplifier to a receiving WDM, such as the amplifier 18 in fig. 1 of Kobayashi, to boost the optical signal before the demultiplexer of the receiving WDM. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to include an optical amplifier, such as the one in fig. 11 of Irie, in the receiving unit and monitoring a transmitted total optical strength level (Irie, fig. 11, coupler 76 and detector 78) of at least one of the ranges of the amplified wave division multiplexed optical signal using a fifth monitor at the receiving unit after said transmitting step; and monitoring a transmitted probe optical strength level (Irie, fig. 11,

Art Unit: 2633

coupler 76 and TILT SENSOR 72) of at least one of the wavelengths of the amplified wave division multiplexed optical signal using a sixth monitor at the receiving unit after transmitting step in order to boost the optical signal power before the demultiplexer of the receiving unit and balance the optical channels at the receivers.

Regarding claims 8-9, and 22-23, because the gain tilt and output optical power of the amplifier in the system by Irie are adjustable. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to adjust the optical amplifiers to obtain a desired optical strength level, including a sum of the input total optical strength level and a sum of the input probe optical strength level at a transmission unit before transmission and the transmitted probe optical strength level and a sum of the input probe optical strength level at a receiving unit after the transmission is identical in the modified system by Irie and Kobayashi. One person of ordinary skill in the art would have been motivated to adjust the amplifiers to obtain a desired optical strength level at the receiving unit in order to balance the performance of all of the channels.

Regarding claim 11 and 21, Irie further teaches that the amplifying step is adjusted based upon the total optical strength level, the probe optical strength level, the transmitted total optical strength level and the transmitted probe optical strength level (fig. 11).

Art Unit: 2633

7. Claims 29-30, and 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Irie (U.S. Patent US 6,682,713 B2) in view of Sugata (U.S. Patent US 5,907,429) and further in view of Lagerstrom et al. (U.S. Patent US 6,215,583 B1).

Regarding claims 29-30 and 35-36, the system of Irie and Sugata differs from the claimed invention in that Irie and Sugata do not specifically teach to use a narrow band filter for selecting a probe wavelength. However, it is well known in the art to use a narrow band filter to select a wavelength from a WDM signal. For example, Lagerstrom teaches to use a narrow band filter to extract a signal using a narrow band filter (column 2, lines 20-26). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to incorporate a narrow band filter, as it is taught by Lagerstrom, in the system of Irie to replace the transmission filter in the tilt monitor in order to increase the sensitivity of tilt sensor.

Allowable Subject Matter

8. Claims 31 and 37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

9. Applicant's arguments with respect to claims 1-25 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Shimojoh et al. (U.S. Patent US 6,344,914 B1) disclose a gain equalizer for equalizing the gain of an optical amplifier; Yang (U.S. Patent US 6804,464 B2) discloses a wavelength management apparatus for optical networking; Sugaya et al. (U.S. Patent US 6,480,329 B2) discloses an optical amplifier; Nakazato (U.S. Patent US 6,599,039 B1) discloses an optical transmission monitoring apparatus; and Hainberger et al. (U.S. Patent Application Publication US 2004/0004756 A1) disclose a

Art Unit: 2633

control scheme for optical channels in wideband WDM optical fiber transmission system.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quan-Zhen Wang whose telephone number is (571) 272-3114. The examiner can normally be reached on 8:30 AM - 5:00 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

qzw
7/21/2005


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